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Immediate Early Gene Expression in D1-SPNs and D2-SPNs During a Striatum-dependent Reinforcement Learning Task

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Mentored by:
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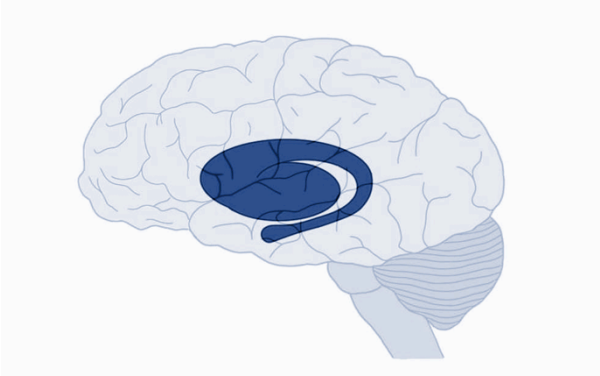
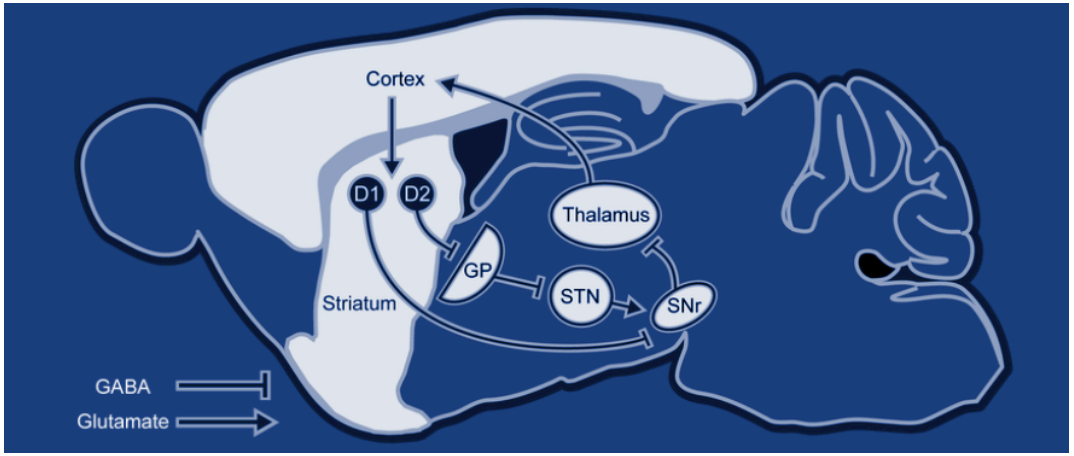
Feinberg Medicine

Outline

- Background
- Purpose
- Training
- Analysis Methodology
- Data
- Conclusions
- Potential Future Research
- Bibliography
- Acknowledgements

Striatum and D1/D2 SPNs





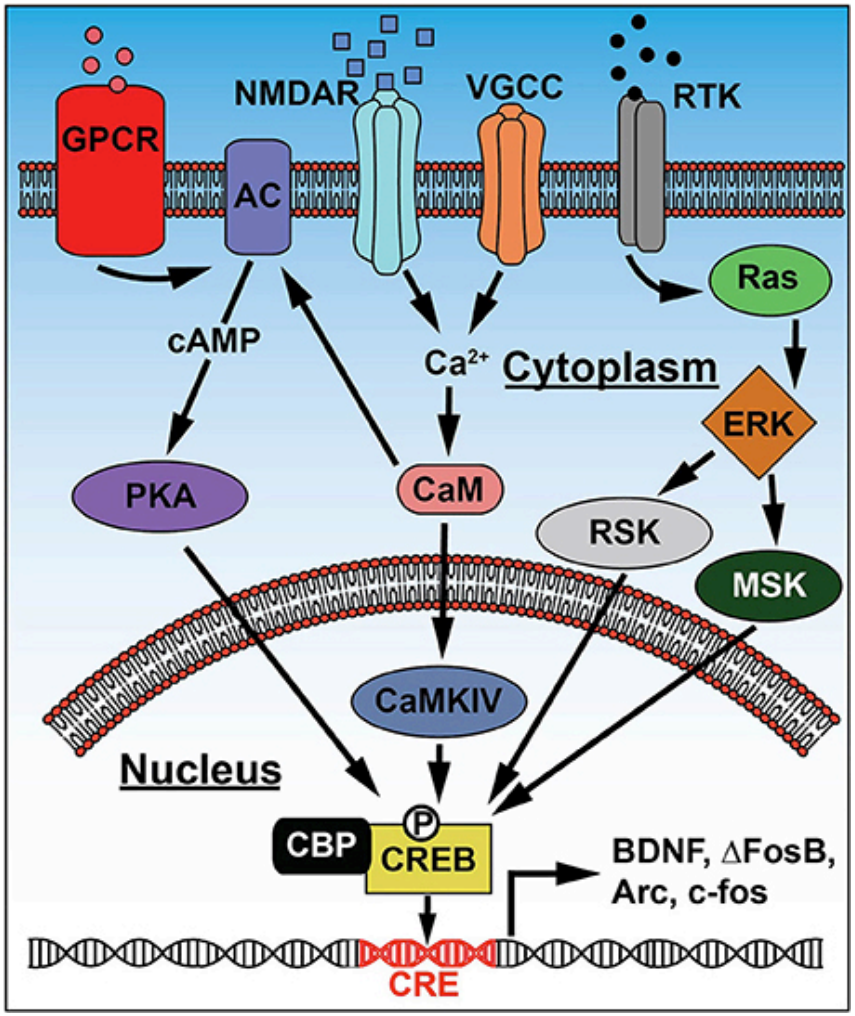
Purpose

To determine whether immediate early genes are differentially activated in D1- and D2-SPNs during a striatum-dependent reinforcement learning task.

Hypothesis

Learning causes increases in D1-SPN and decreased in D2-SPN Fos expression, a marker of neural activity.

Immediate Early Gene Expression



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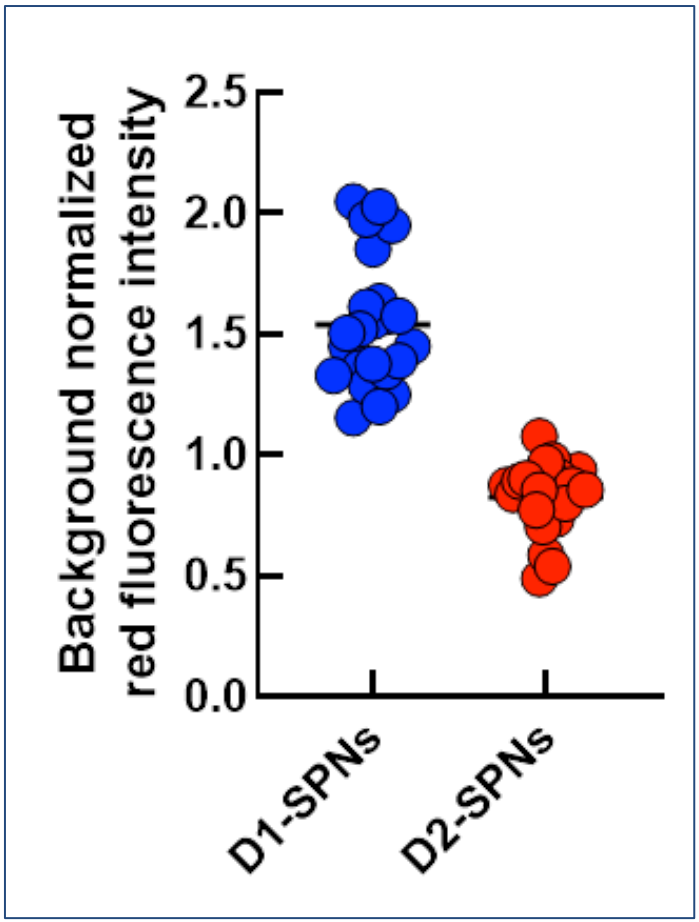
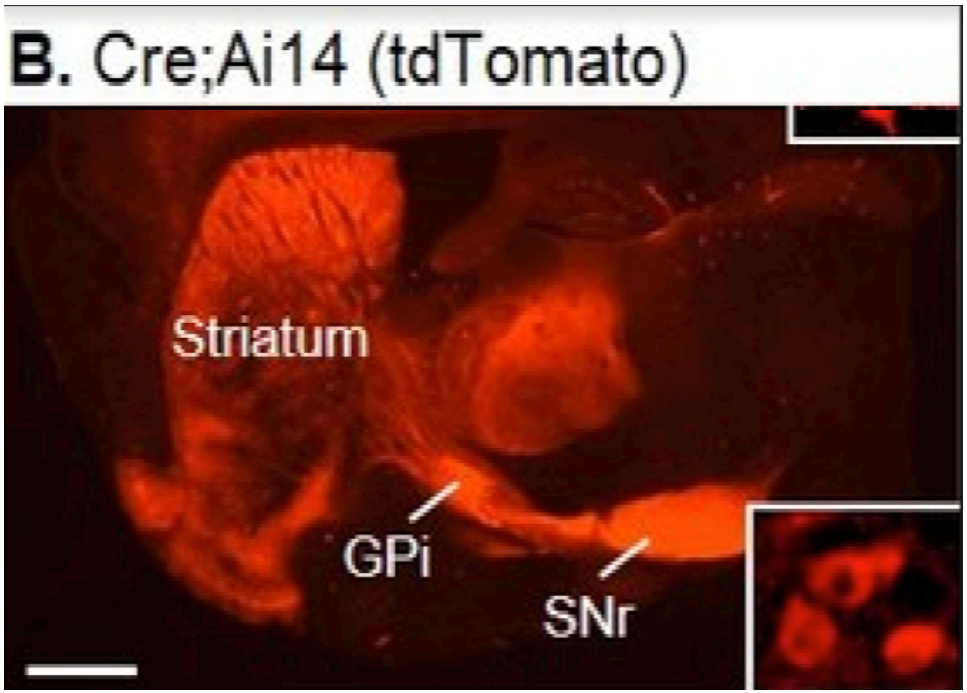
tdTomato Expression





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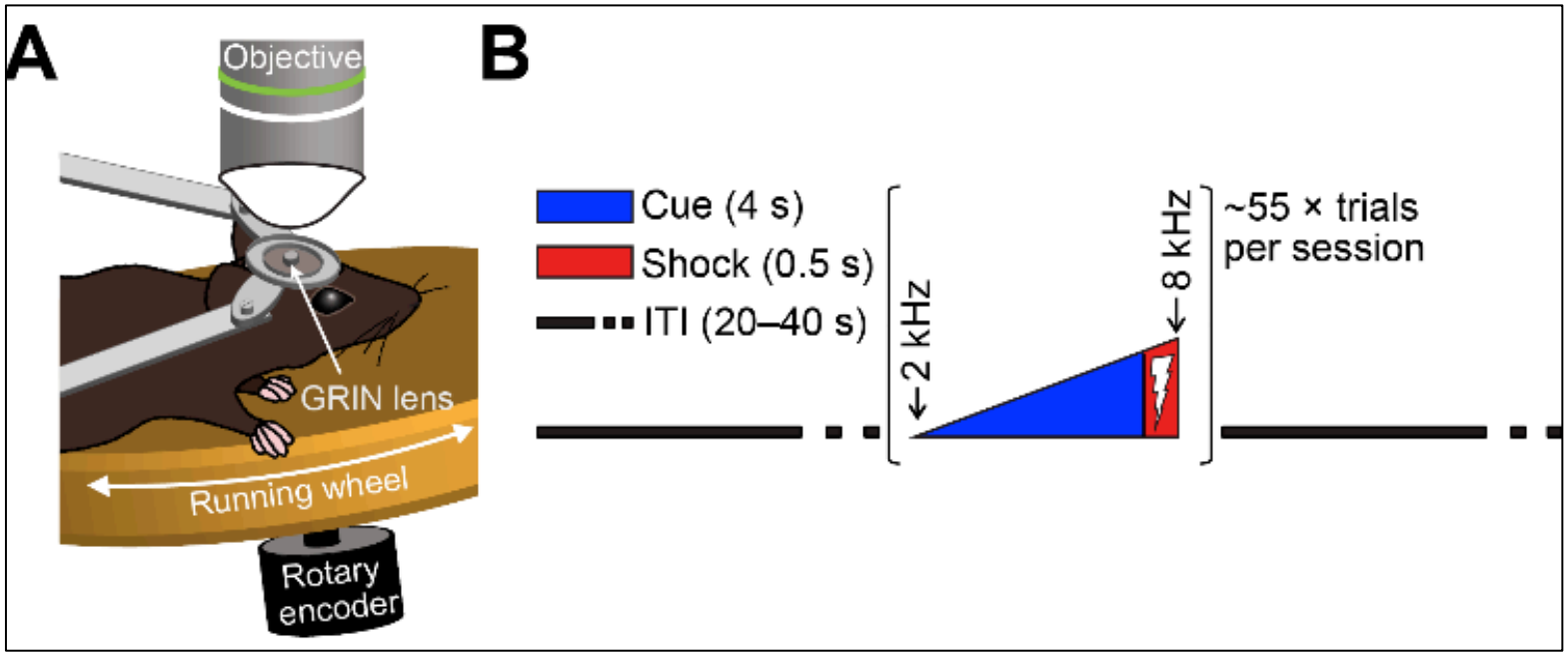
Training



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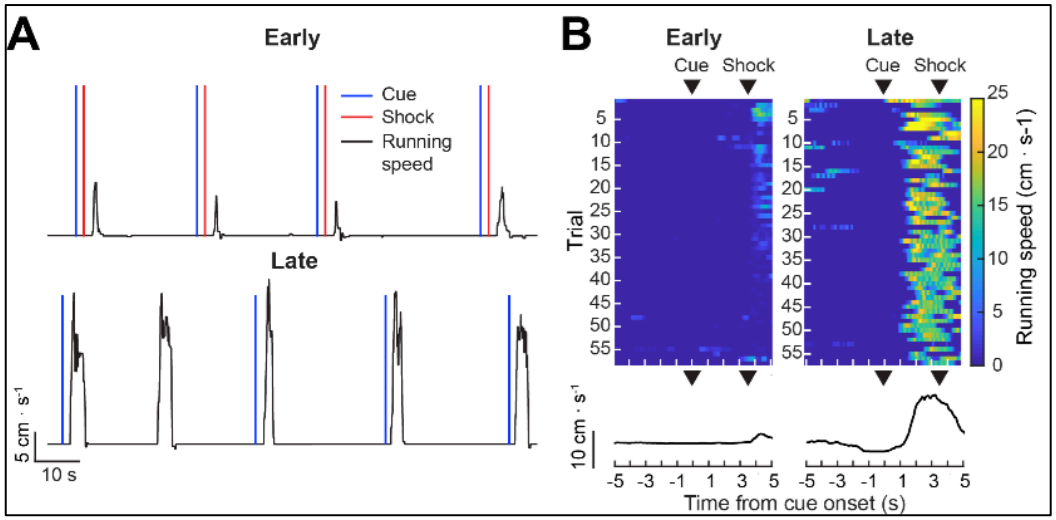
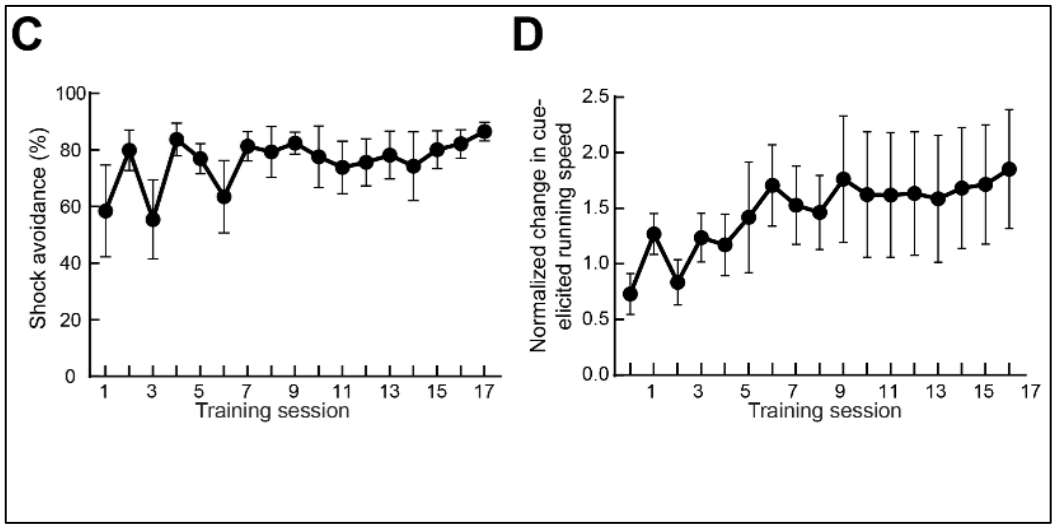
Learner Data





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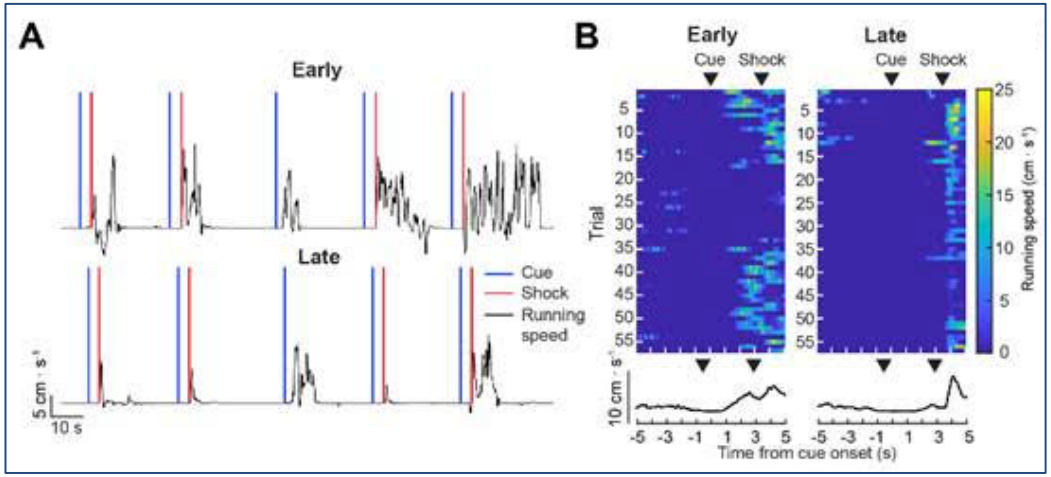
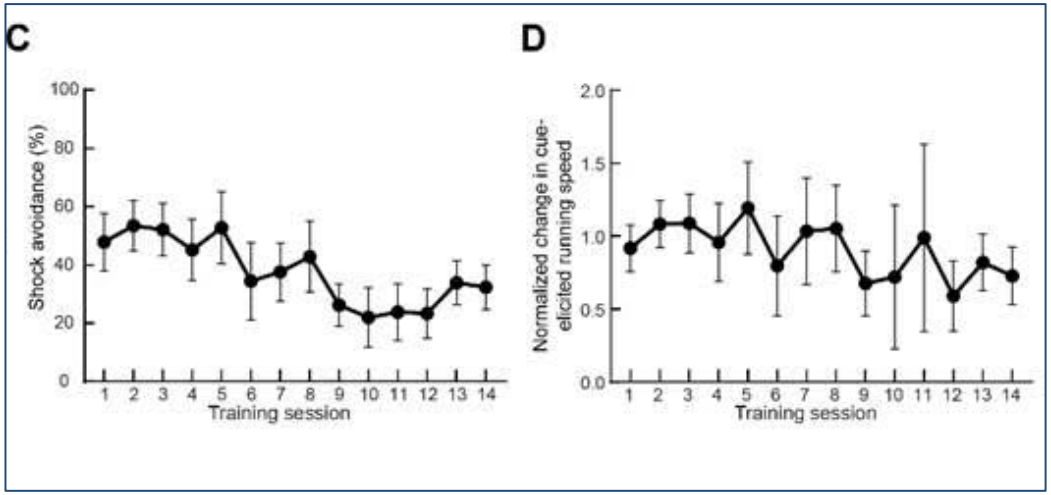
Non Learner Data





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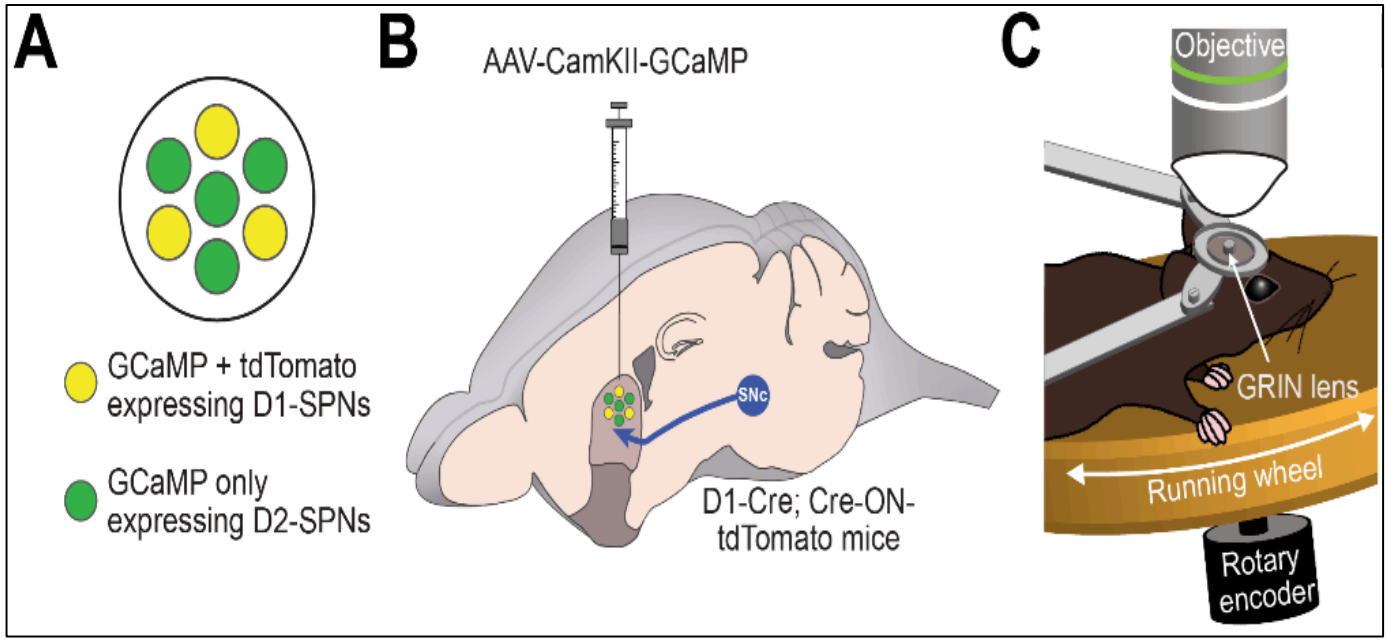
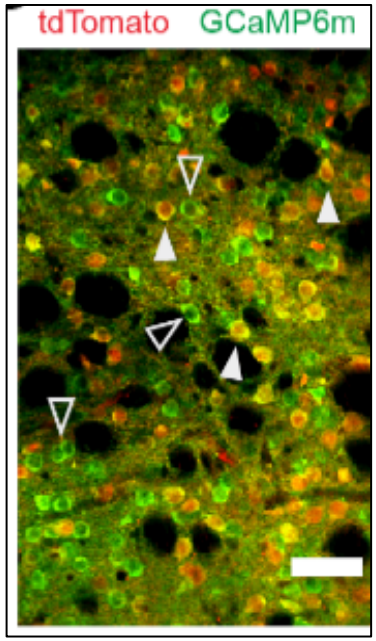
Cell Identification Approach for Calcium Indicators





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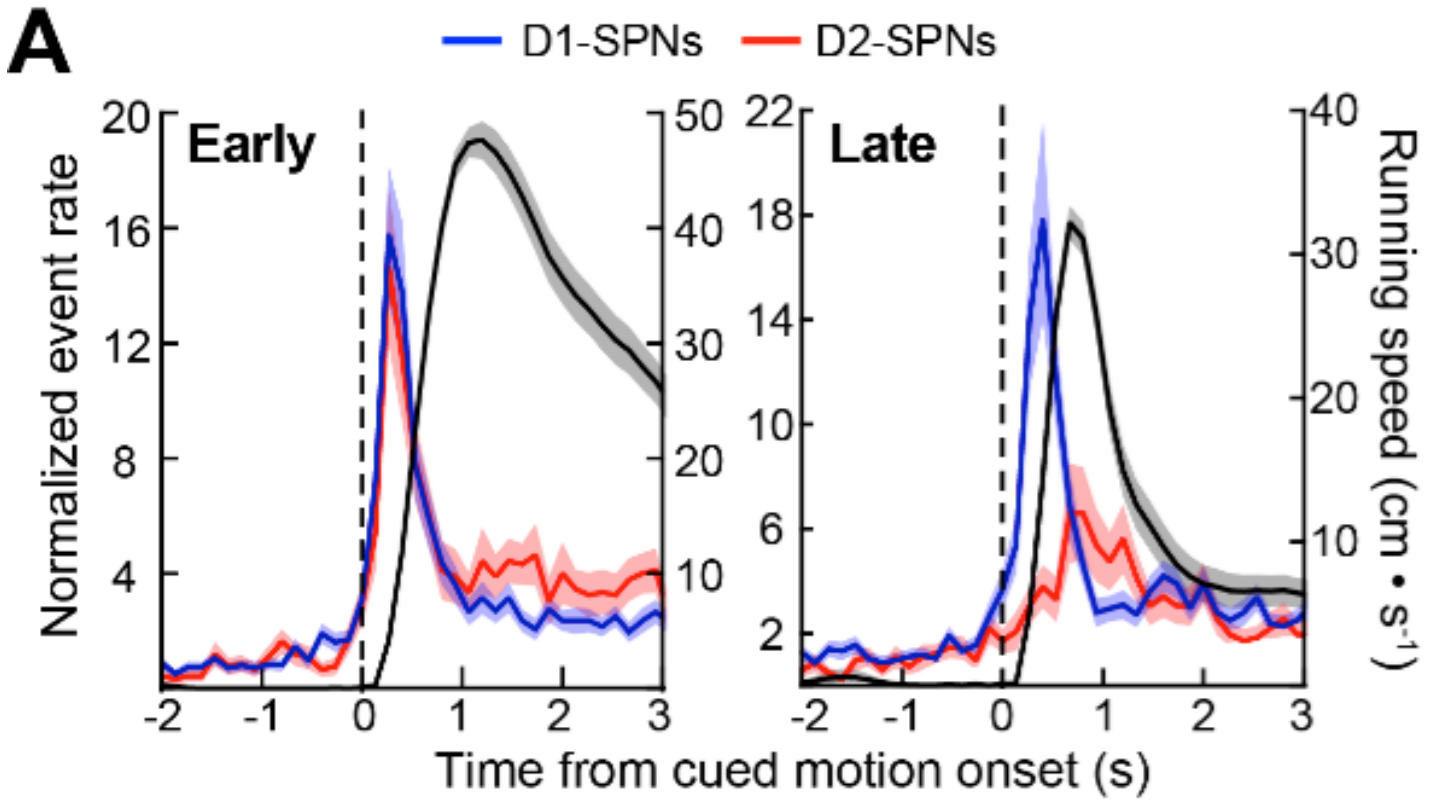
Results of the Conditioned Avoidance Task



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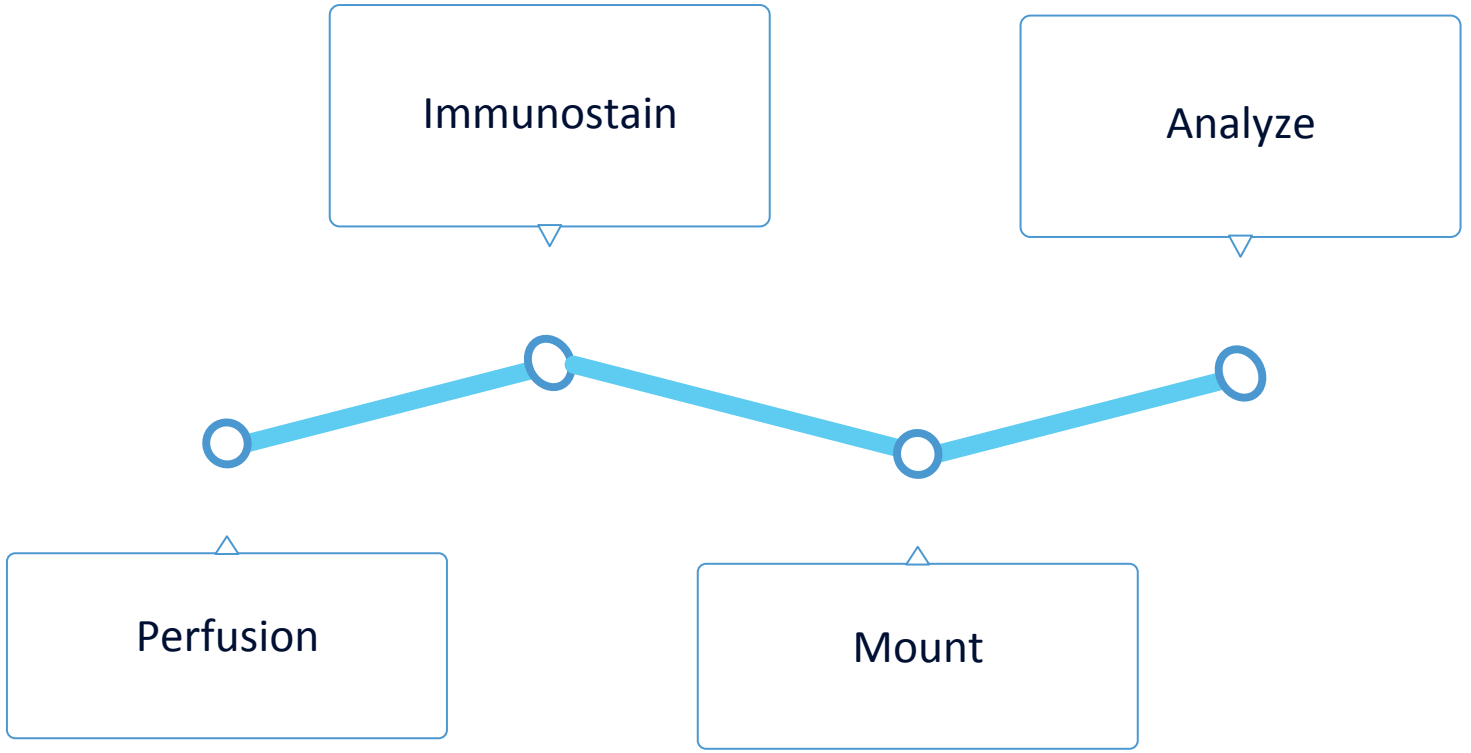
Cell Identification Approach for c-Fos Indicators



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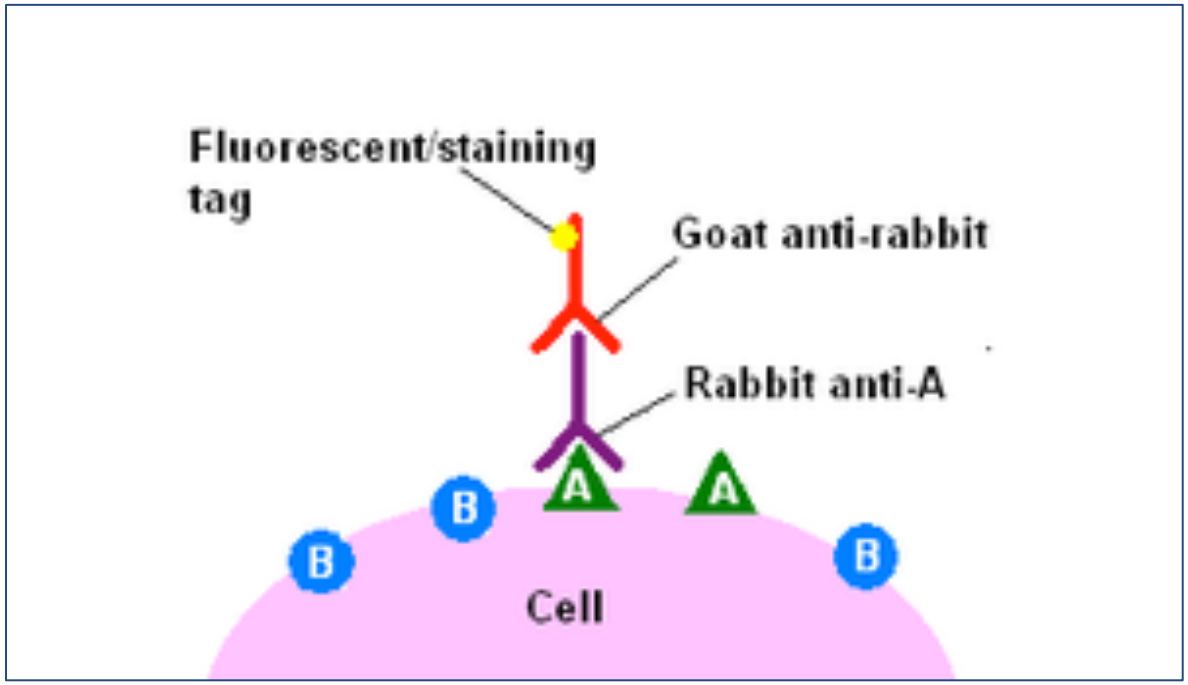
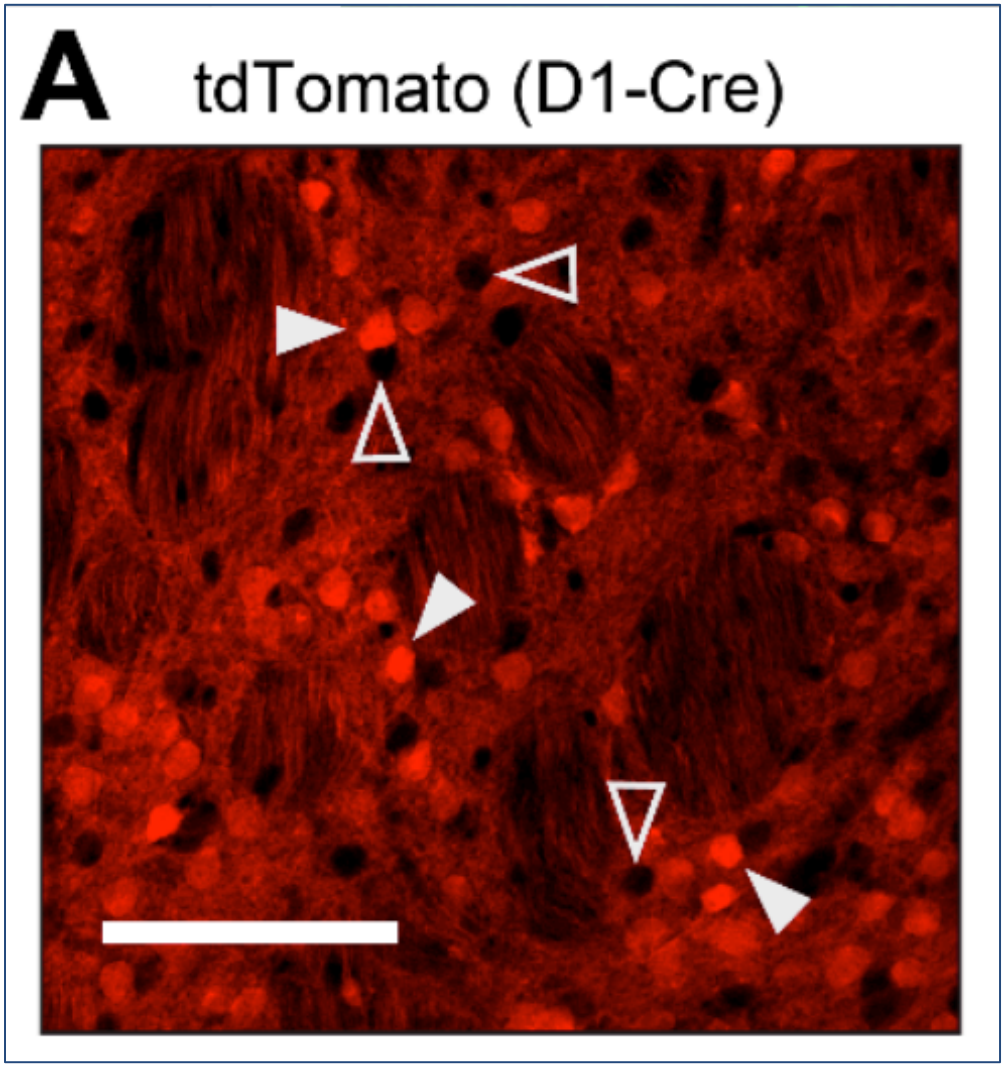
Immunostain



https://en.wikipedia.org/wiki/Immunohistochemistry#/media/File:Immunohistochemicalstaining2.PNG

Images - tdTomato



Expression of tdT markers within cells

Marks D1 cells only

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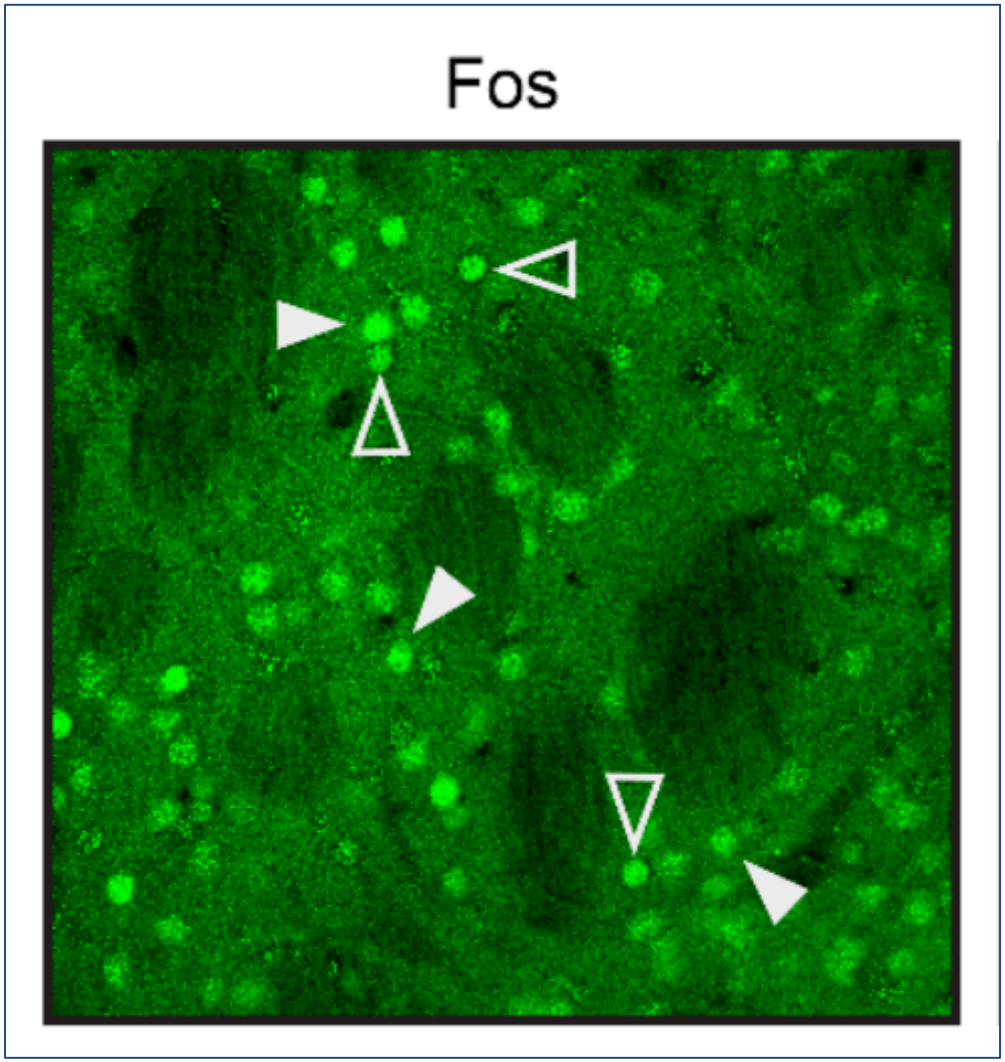
Images - Fos



Expression of Immunostained Fos within cells

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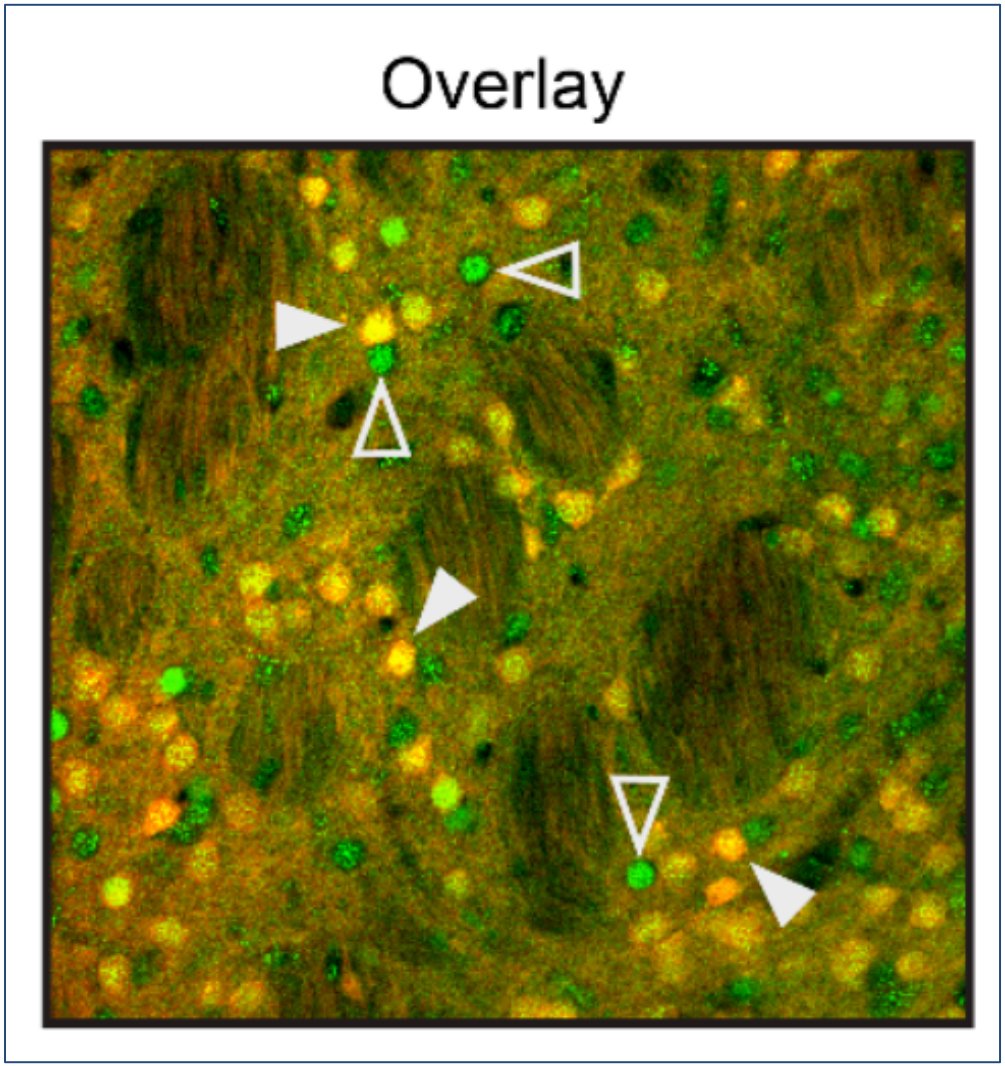
Images Overlay



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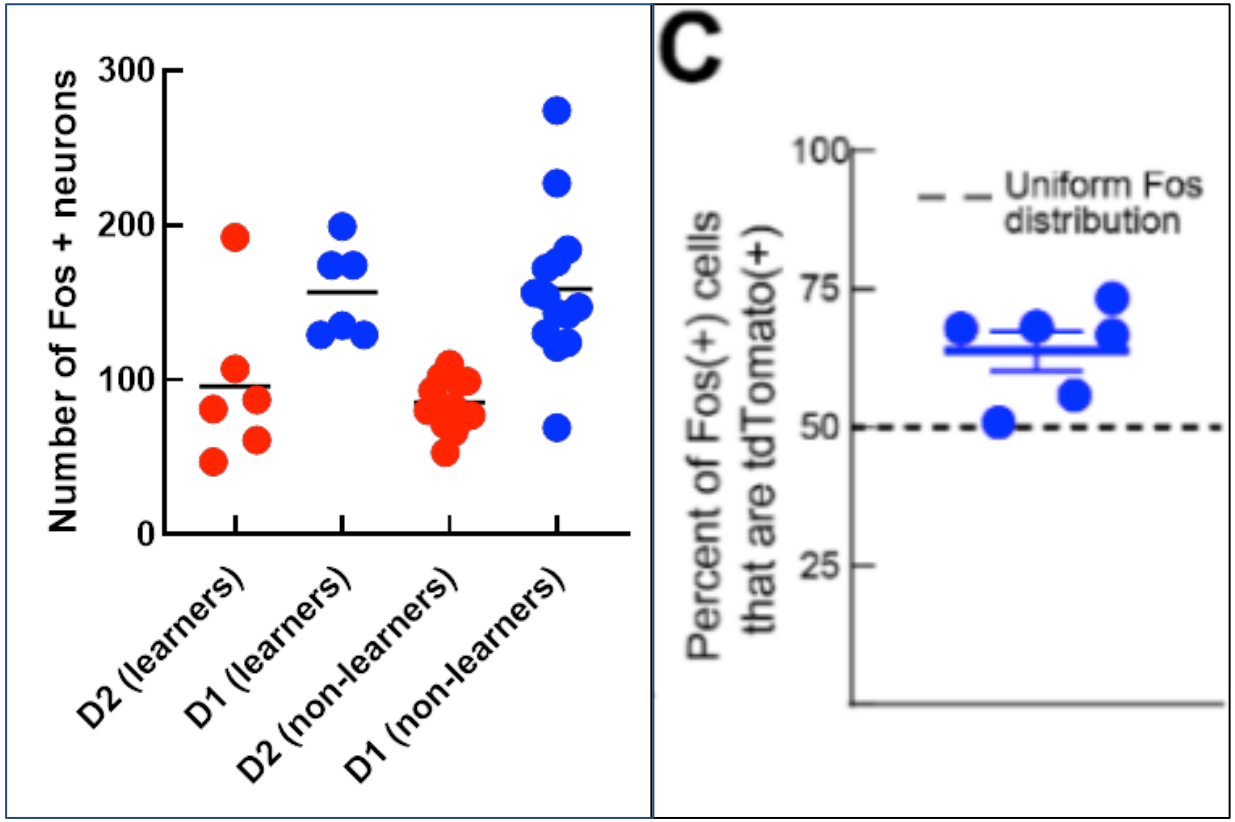
Quantified Results of Fos(+) Cells



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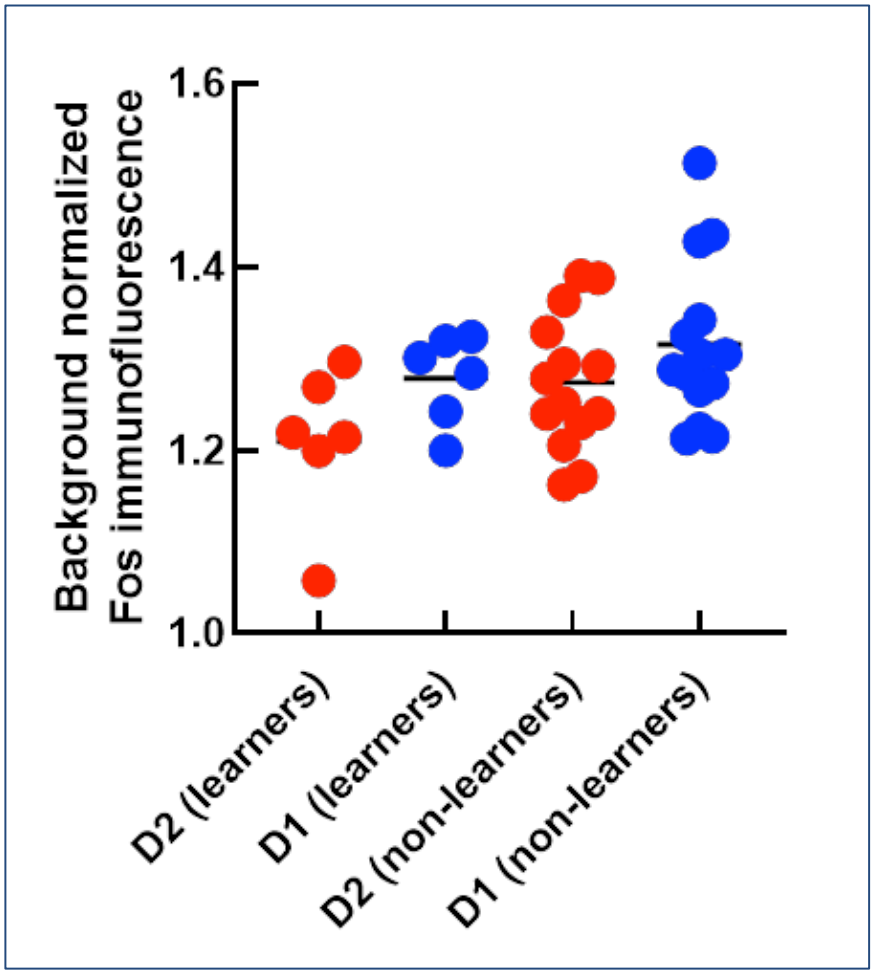
Average Intensities



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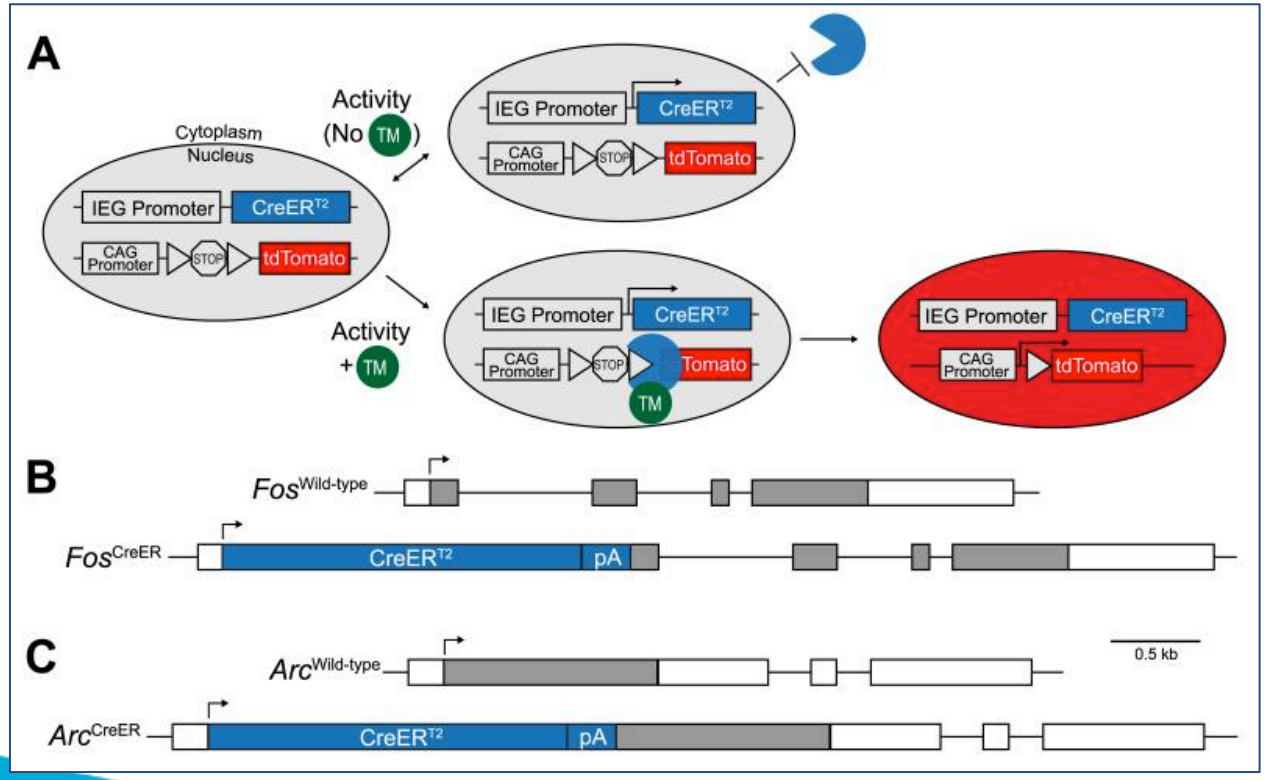
Conclusions

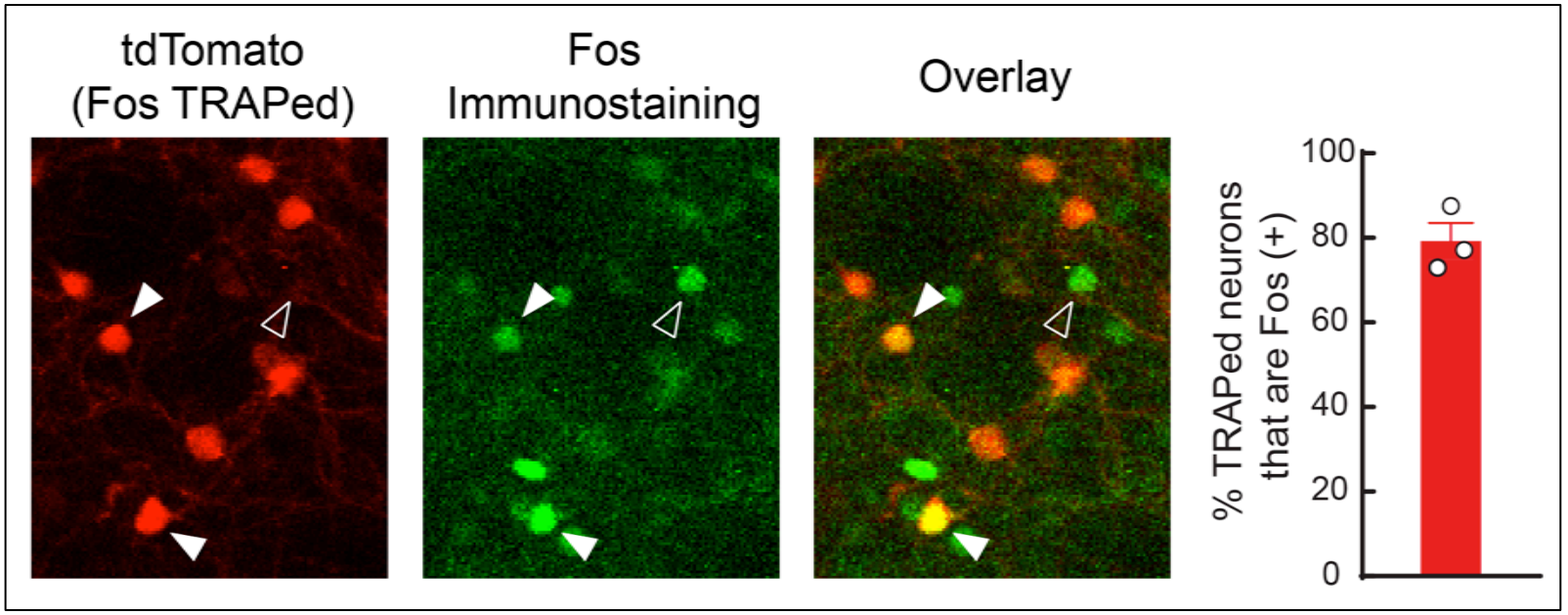
- Preliminary calcium imaging showed higher D1 activity and lower D2 activity
- More D1 cells activated for fos, not as much D2

- However, average intensities for fos expression are similar
- Not certain on what is causing the activation of D2 cells

Potential Future Research (Fos-TRAP2)

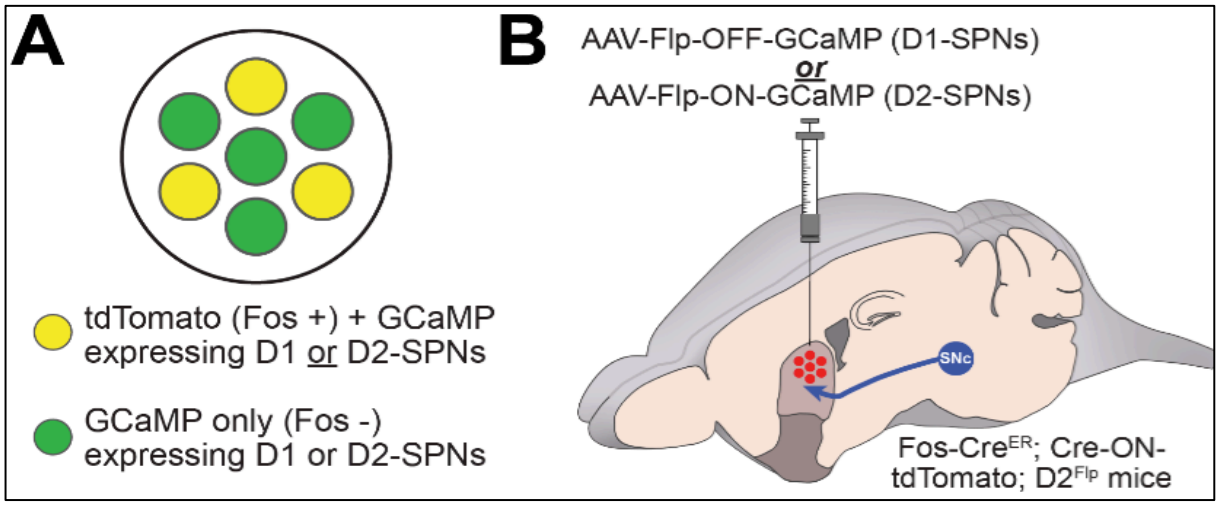


Potential Future Research (Fos-TRAP2)



Further Potential Research

- Groundwork for future striatal neural impacts
- Potential therapies



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Acknowledgements

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